

Meeting: 1006, Lubbock, Texas, SS 2A, Special Session on Differential Geometry and Its Applications

1006-53-88 **M. Melko*** (mike.melko@northern.edu), Department of Mathematics, Northern State University, 1200 South Jay Street, Aberdeen, SD 57401. *Rendering Costa's Minimal Surface with Mathematica and 3D Printer Technology*. Preliminary report.

3D printers are devices that produce solid objects from appropriate input data, and were originally created for rapid prototyping of new product designs, but are increasingly being used for other purposes, including highly customized manufacturing and scientific visualization. Their applications will continue to grow as the underlying technology improves and decreases in cost.

As input, 3D printers require data specifying the vertices, polygons, and normals of the object to be rendered. Various file formats can be used to store this data, including the *Polygon File Format* or *PLY*, (also known as the *Stanford Triangle Format*). The *Weierstrass representation* for Costa's minimal surface is used to produce the data required to create a solid model. Since the Weierstrass φ and ζ functions, which are the basis for the representation, are built into *Mathematica*, it is relatively easy to generate this data. A *Mathematica* package is being developed for this purpose, and should prove useful for generating solid models of a large class of minimal surfaces. (Received February 08, 2005)